1-7-2016

2016 AQ Summit: Innovation Update by Isabelle Gendron-Lemiuex

Isabelle Gendron-Lemiuex

Innovations in Seaweed Culture in Quebec

An overview

Isabelle Gendron-Lemieux *et al*.
Project coordinator and Biologist
Merinov
January 7, 2016

Research programme -1

merinov

2012-2017: **Industrial Research Chair Grant from NSERC on seaweeds (2012-2017)**

1. **Harvest of wild resources**
   - a. *Gather available data on seaweed beds*
   - b. *Improve acoustic detection techniques*
   - c. *Develop new tools for seaweed harvest*
2. **Cultivation on marine farms**
   - a. *Optimization and scaling up*
   - b. *Co-cultivation shellfish-seaweeds*
   - c. *Master cultivation techniques for more sp.*
3. **Processing and product development**
   - a. *Food industry*
   - b. *Nutraceuticals / pharmaceuticals*
   - c. *Composite biomaterials*

9 researchers & teachers
6 partner companies

Fermes marines du Québec inc.

Biotaag International inc.

ORGANICOCEAN™

PRO-ALGUE MARINE INC.

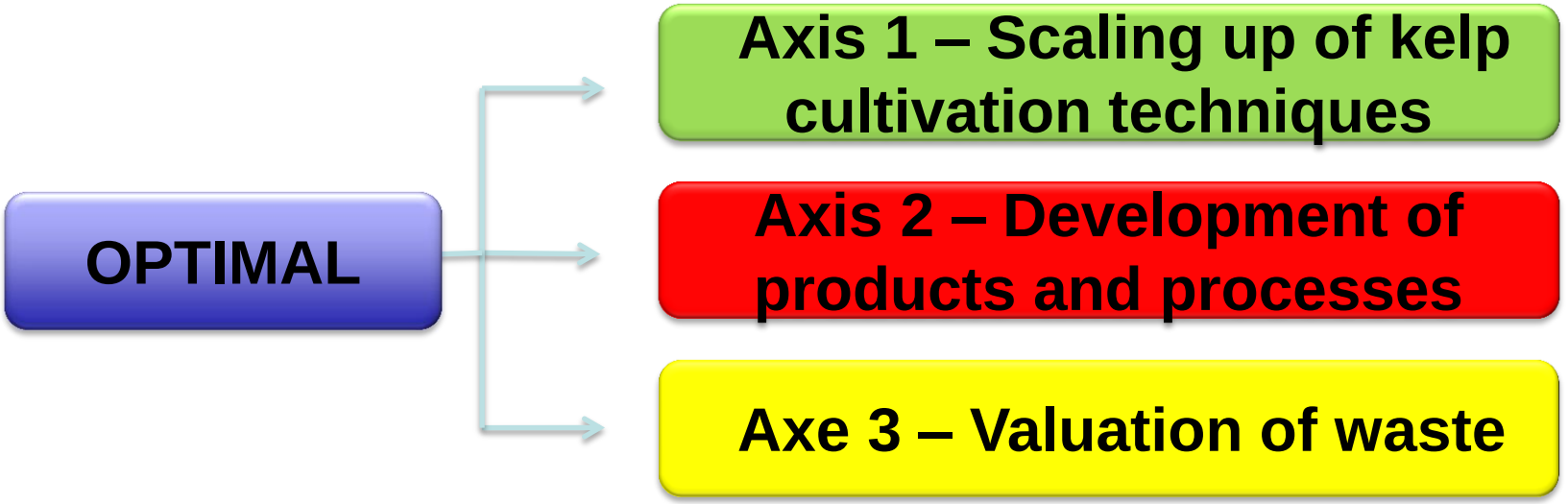
innoVactiv

SCF Pharma

Chair Head: Éric Tamigneaux

Research programme - 2

2014-2019: R&D programme on cultivated *S. latissima*



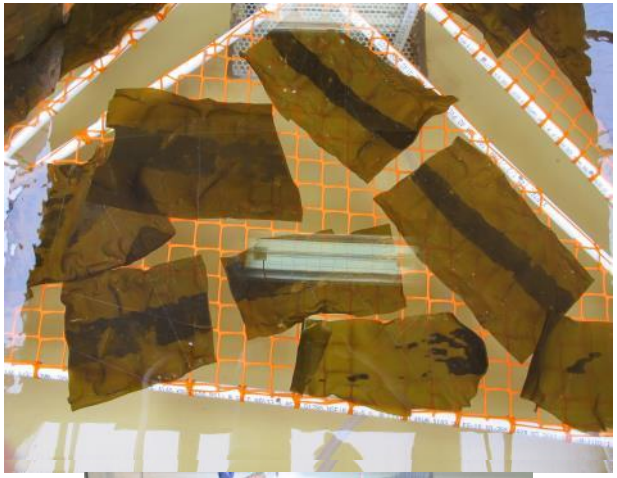
Industrial partners

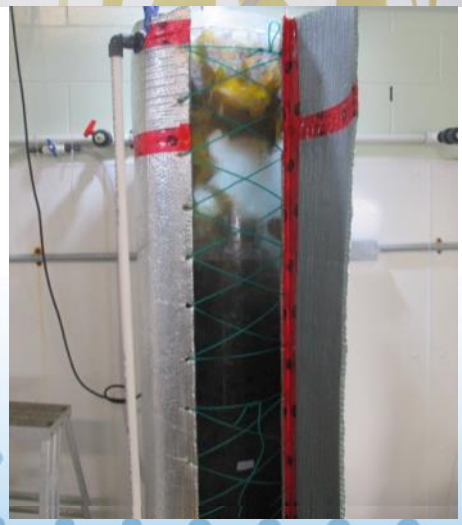
R&D partners

KELP PRODUCTION - HATCHERY

Obtaining spore producing tissue

32-33 days





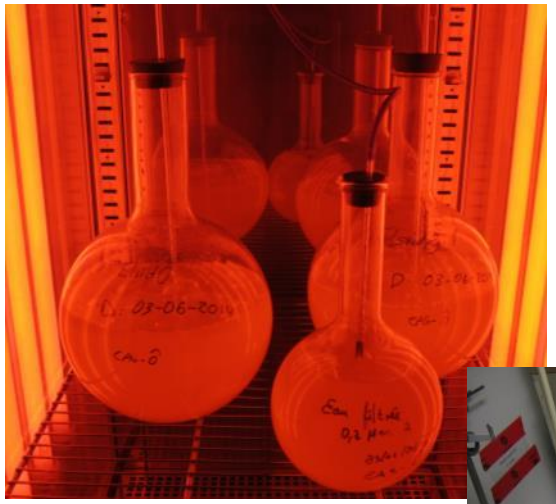
Alternate conditioning method

- Reduce floor space required
- Obtain more sorus tissue
- 35 days

Bourdages, D and Garnier, P

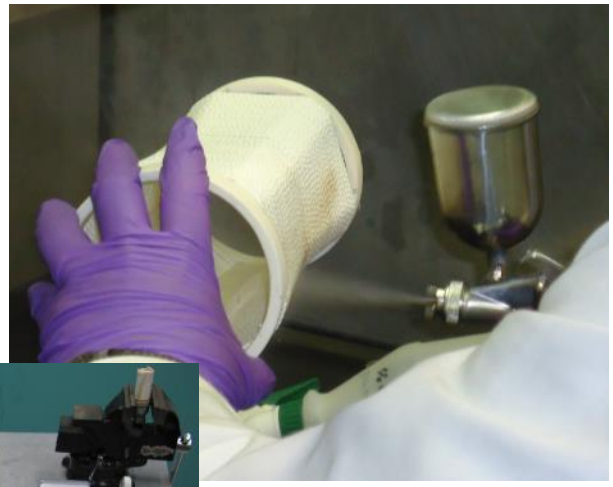
KELP PRODUCTION - HATCHERY

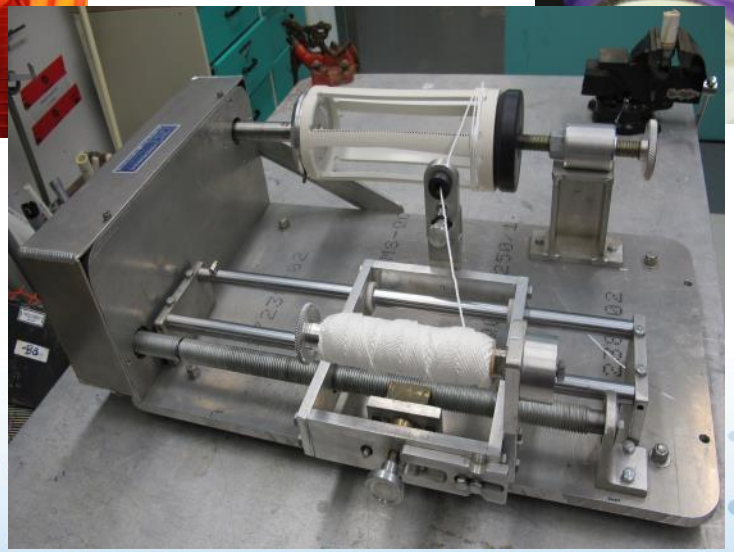
Free-living



58 + 13 days

Seeding





Meanwhile….

Will Nicolas and Murray, H

KELP PRODUCTION - HATCHERY

Pilot scaling up and direct seeding

Research

Private hatchery

KELP PRODUCTION - HATCHERY

Optimisation of hatchery procedures

Seeding density (free-living)

- **Goal**: Optimal amount of gametophytes to seed on spools
- **Densities tested**:
  - 6, 4, 2 and 0,5 g gametophyte/spools

KELP PRODUCTION - HATCHERY

Culture media

Goal: Identify the medium that is the least expensive and gives the best growth

Media tested:

- f/2, nitrate+phosphate, PES and Miracle Gro

Water desinfection

Goal: Identify the technique that is the least labour intensive and prevents contamination

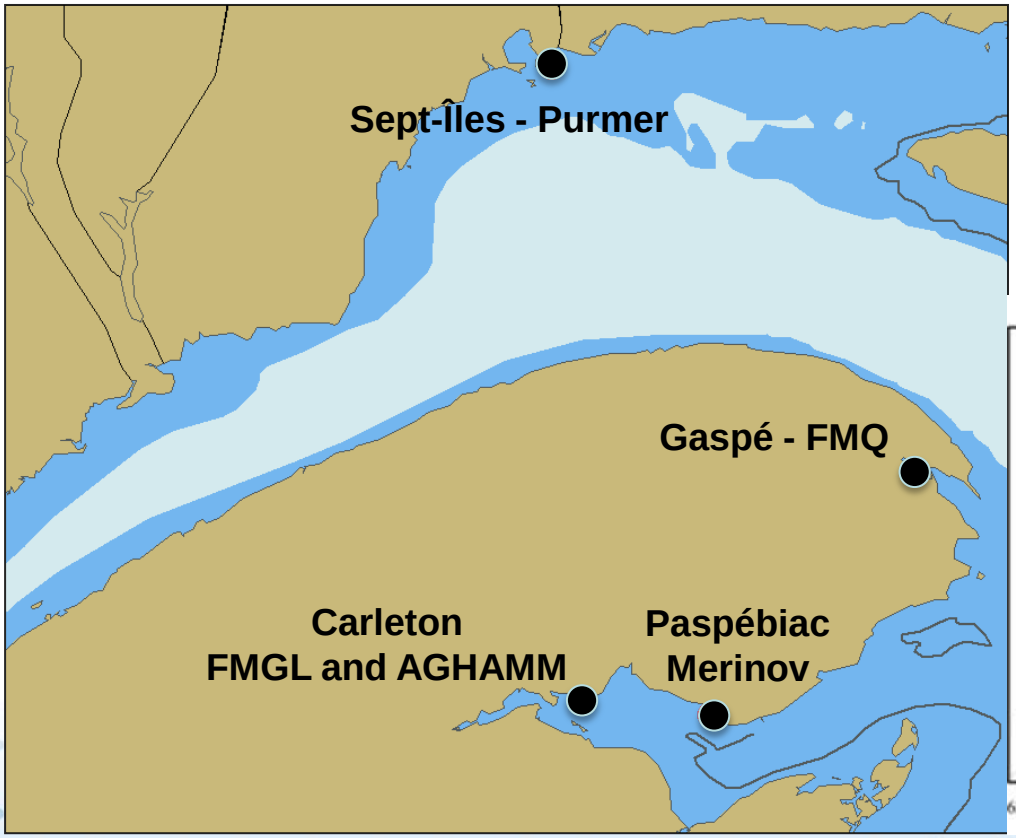
Techniques tested:

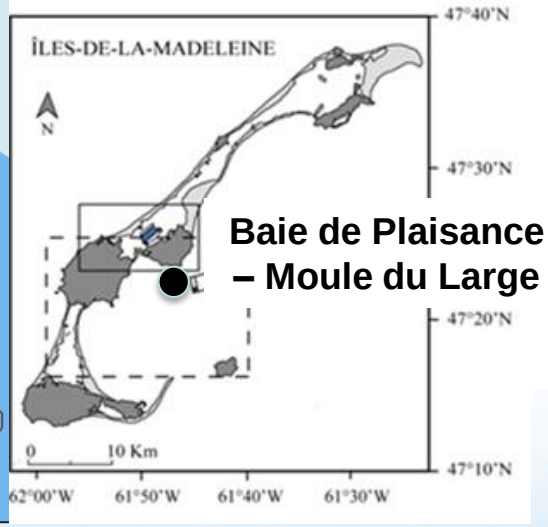
- Filtration and UV, pasteurization, salinity, chlorine and acid

Garnier, P

KELP PRODUCTION – AT SEA

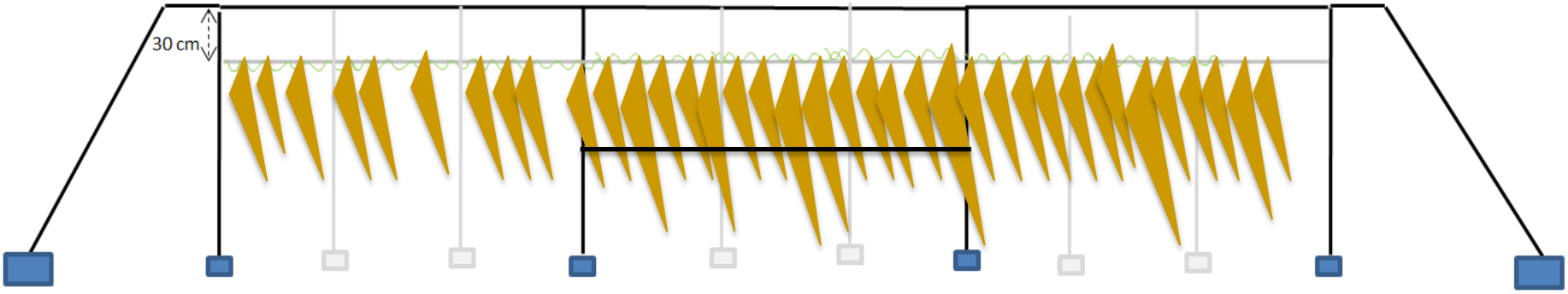
Testing new culture sites





KELP PRODUCTION – AT SEA

Harvesting strategies vs yields

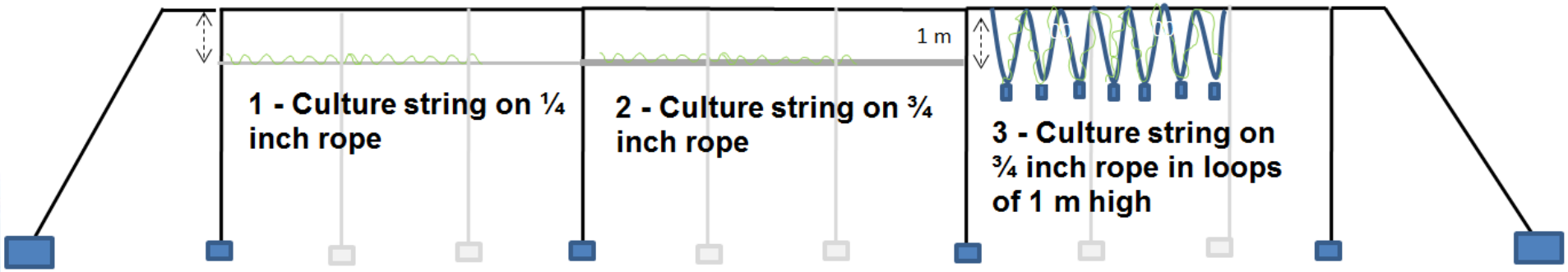


1 – Spring thinning

2 – Spring partial harvest

3 – Maximum density

Culture gears vs yields



1 - Culture string on ¼ inch rope

2 - Culture string on ¾ inch rope

3 - Culture string on ¾ inch rope in loops of 1 m high

DIVERSIFICATION

Working on other sp. with commercial potential

Chorda filum
Annual summer sp.
Few information

Saccorhiza dermatodea
Annual arctic sp.
Few information

Laminaria digitata

A. esculenta

Pieddeseaux, S., Solomon, L. and Tamigneaux, T.

MOLECULE EXTRACTION

Laboratory scale work (Summer 2015)

- D-mannitol extractions of samples taken at the various sites throughout the summer from May to July

Other tests

- Fucoxanthine, β-carotenes and violaxanthine
- Phlorotannin

Scaling up (Winter-Summer 2016)

- Identify the best sequence to extract the various molecules of interest

FOOD PRODUCTS R&D

DRYING

Conventional air drying

-Low TºC (40-50ºC)

-Simple

-Higher cost at the industrial level ;

• Loss of certain vitamins ;

• Alteration of food taste

Contained Zeodration

-Vaccum drying improved by the absorption of water by zeolites;

-Very soft drying operation;

-The product keeps gustatory, olfactory, visual and nutritional quality.

Instant controlled pressure drop (D.I.C.)

-Short treatment (30 to 60 s)

-Ends with a drastic and rapid pressure drop that generates the water extraction, drying and texturing of the product (swell - drying)

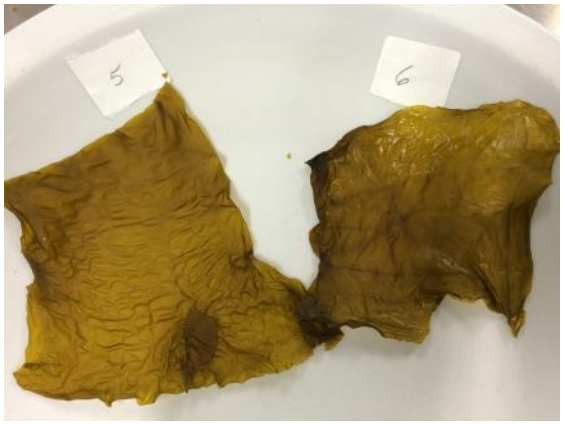
- Increasing the availability of bioactive molecules

Berger, K. and Michaud, H

FOOD PRODUCTS R&D

FRESH SEAWEED IN TRAYSEALING IN MODIFIED ATMOSPHERE (MAP)

SMOKED SEAWEED



COLD-PASTEURIZED SEAWEED High Pressure Process (HPP)

SEAWEED PRODUCTS BY TECHNOLOGY OF EXTRUSION COOKING

Berger, K. and Michaud, H

FOOD PRODUCTS R&D

SENSORY ANALYSIS

- Evaluate the general acceptability and quality attributes of the seaweed products : general appearance, colour, odour, flavour, texture
- Expert sensory evaluation : **MERINOV**
- Consumer panel : **CINTECH**

Berger, K. and Michaud, H

CONCLUSION

Where we are at…

- Seaweed Culture
  - Transferring to industry and scaling up (hatchery/at sea)
  - Reducing production costs
  - Demonstrating feasibility and adapting culture methods to various climatic and industrial contexts
  - Developing culture techniques for more sp
- Kelp processing
  - Identifying the products and processes to obtain maximum value from kelp biomass
  - Building a network of specialists to develop an integrated production chain

merinov

CENTRE D'INNOVATION DE L'AQUACULTURE ET DES PÊCHES DU QUÉBEC

Fermes marines DU QUÉBEC INC.

La Moule du Large

La Ferme Maricole Burmer

CNETE

GroupeCTTGroup

Innofibre

MERCI DE VOTRE ATTENTION !

Lelièvre, Lelièvre Lemoignan Itée

ATRIUM INNOVATIONS

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oleotek